

Amendments to the Claims:

The following listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) An apparatus for detecting a heart sound of a living subject, comprising:

a memory device which stores heart-sound characteristic information which is characteristic of a heart sound of the subject;

~~a heart sound sensor which is adapted to be worn on a body portion of the subject that is distant from a chest of the subject and which detects, from the body portion, a physical signal containing a heart sound component and supplies the physical signal; and~~

~~a pressure-pulse-wave sensor which is adapted to be worn on a limb of the subject, detects a pressure pulse wave which is produced from an artery of the limb and is propagated from the artery to the pressure-pulse-wave sensor, and produces a pressure-pulse-wave signal representing the detected pressure pulse wave and containing a heart-sound component; and~~

a heart-sound determining means for determining, based on the heart-sound characteristic information stored in the memory device, the heart-sound component contained in the ~~physical~~ pressure-pulse-wave signal.

2. (Currently Amended) An apparatus according to claim 1, further comprising:

a heart-sound microphone which is adapted to be worn on a chest of the subject and detects, in advance, the heart sound of the subject; and

a heart-sound characteristic-information obtaining means for obtaining the heart-sound characteristic information from the heart sound detected in advance by the heart-sound microphone from the chest of the subject, wherein:

wherein the heart-sound characteristic-information obtaining means
obtains the heart-sound characteristic information comprising a heart- sound
frequency range consisting of a plurality of frequencies which are predetermined by
subjecting, to a frequency analysis, the heart sound detected in advance by the heart-sound
microphone from the chest of the subject, and

wherein the heart-sound determining means extracts,comprises a first
heart-sound determining means for extracting from the physical-pressure-pulse-wave signal,
the heart-sound component having the plurality of frequencies of the heart-sound frequency
range.

3. (Currently Amended) An apparatus according to claim 1, further comprising:
a heart-sound microphone which is adapted to be worn on a chest of the
subject and detects, in advance, the heart sound of the subject; and
a heart-sound-characteristic-information obtaining means for obtaining the
heart-sound characteristic information from the heart sound detected in advance by the heart-
sound microphone from the chest of the subject, wherein:

wherein the heart-sound-characteristic-information obtaining means
obtains the heart-sound characteristic information comprising a first portion of the
heart sound detected in advance by the heart-sound microphone from the chest of the subject,
said first portion being detected during a predetermined time interval, and

wherein the heart-sound determining means comprises a second heart-
sound determining means for determiningdetermines, as the heart-sound component, a second
portion of the physical-pressure-pulse-wave signal supplied by the heart soundpressure-pulse-
wave sensor, said second portion having a length corresponding to the predetermined time
interval and having a waveform best approximating a waveform of said first portion of the
heart sound.

4. (Currently Amended) An apparatus according to claim 1, further comprising:

a heart-sound microphone which is adapted to be worn on a chest of the

subject and detects, in advance, the heart sound of the subject; and

a heart-sound-characteristic-information obtaining means for obtaining the

heart-sound characteristic information from the heart sound detected in advance by the heart-

sound microphone from the chest of the subject, wherein:

wherein the heart-sound-characteristic-information obtaining means

comprises a frequency-time analyzing means for subjecting, to a frequency-time analysis, the

heart sound detected in advance by the heart-sound microphone from the chest of the subject,

and thereby providing a frequency-time analyzed signal,

wherein the heart-sound-characteristic-information obtaining means

obtains the heart-sound characteristic information ~~comprises comprising~~ a first portion of the

heart sound detected in advance ~~by the heart-sound microphone~~ from the chest of the subject,

said first portion having a plurality of frequencies of a heart-sound frequency range which is

predetermined based on ~~a~~ the frequency-time analyzed signal of the heart sound, provided by

the frequency-time analyzing means, and being detected during a predetermined time interval,

and

wherein the heart-sound determining means ~~determines, comprises~~:

a first heart-sound determining means for extracting, from the

pressure-pulse-wave signal, a signal component having the plurality of frequencies of the

heart-sound frequency range, and

a second heart-sound determining means for determining, as the

heart-sound component, a second portion of the ~~physical signal supplied by the heart sound~~

~~sensors~~ signal component extracted by the first heart-sound determining means, said second

portion having the plurality of frequencies of the heart-sound frequency range, having a

length corresponding to the predetermined time interval, and having a waveform best approximating a waveform of said first portion of the heart sound.

5. (Currently Amended) An apparatus according to claim 2, further comprising:

~~a heart sound microphone which is adapted to be worn on the chest of the subject and detects, in advance, the heart sound of the subject; and~~
a frequency-time analyzing means for subjecting, to a frequency-time analysis, the heart sound detected in advance by the heart-sound microphone from the chest of the subject, and thereby providing a frequency-time analysis signal; and

~~a heart-sound-frequency-range determining means for determining the heart-sound frequency range based on the frequency-time analyzed signal provided by the frequency-time analyzing means by subjecting, to the frequency analysis, the heart sound detected in advance by the heart-sound microphone from the chest of the subject.~~

6. (Currently Amended) An apparatus according to claim 3, further comprising:

~~a heart sound microphone which is adapted to be worn on the chest of the subject and detects, in advance, the heart sound of the subject; and a waveform determining means for determining, from the heart sound detected in advance by the heart-sound microphone from the chest of the subject, the waveform of said first portion which is detected during the time interval between a first predetermined periodic point of the heart sound and a second predetermined periodic point thereof.~~

7. (Currently Amended) An apparatus according to claim 1, further comprising:

~~a heart-sound microphone which is adapted to be worn on the a chest of the subject and detects, in advance, the heart sound of the subject; and~~
a heart-sound-characteristic-information obtaining means for obtaining the heart sound characteristic information~~heart-sound characteristic information~~ from the heart sound detected in advance by the heart-sound microphone from the chest of the subject.

8. (Original) An apparatus according to claim 7, wherein the heart-sound-characteristic-information obtaining means comprises a frequency-time analyzing means for subjecting, to a frequency-time analysis, the heart sound detected in advance by the heart-sound microphone from the chest of the subject, and thereby providing a frequency-time analyzed signal.

9. (Currently Amended) An apparatus according to claim 8, wherein the heart-sound-characteristic-information obtaining means further comprises a heart-sound-frequency-range determining means for determining, from the frequency-time analyzed signal, a heart-sound frequency range consisting of a plurality of frequencies corresponding to a plurality of signal magnitudes which are greater than a reference value, the heart-sound frequency range providing the ~~heart sound characteristic information~~heart-sound characteristic information.

10. (Currently Amended) An apparatus according to claim 9, wherein the heart-sound-characteristic-information obtaining means further comprises a waveform determining means for determining, as the ~~heart sound characteristic information~~heart-sound characteristic information, a waveform of a first portion of the heart sound detected in advance from the chest of the subject, said first portion having the plurality of frequencies of the heart-sound frequency range, and being detected during a time interval between a first predetermined periodic point of the heart sound and a second predetermined periodic point thereof.

11. (Canceled)

12. (New) An apparatus according to claim 1, wherein:

the heart-sound determining means determines, as the heart-sound component, a second heart sound of the subject, and

the apparatus further comprises a pulse-wave-propagation-velocity determining means for (a) determining a first timing when the second heart sound is detected

by the pressure-pulse-wave sensor, and a second timing when a notch of the pressure pulse wave that corresponds to the second heart sound is detected by the pressure-pulse-wave sensor, (b) determining a time difference of the first and second timings, and (c) determining, based on the determined time difference, a pulse-wave propagation velocity at which the pressure pulse wave is propagated from a heart of the subject to the limb of the subject.